Remarks

Claims 13 - 36 are pending, claims 25 - 36 being newly added here.

Claims 13 - 24 stand rejected under 35 USC 102(b) as being anticipated by Ishizaki et al. Claim 24 also stands rejected under 35 USC 103(a) as being unpatentable over Ishizaki et al. as applied to claim 14, in view of Emanie et al. These rejections are respectfully traversed for the following reasons.

The present invention is directed towards a control device having a so-called load-independent through-flow distribution. Such a control device is a special case of a load-sensing control device.

In a load-sensing control system, the highest load pressure of all simultaneously actuated hydraulic consumers is determined and reported to a pump regulator. This controls the pump in such a way that the latter delivers a quantity of pressure medium such that the pump pressure exceeds the highest load pressure by a pump Δp. Moreover, in a Load Sensing control system, each valve has assigned to it an individual pressure regulator, which keeps the pressure difference over the flow cross section of the respective valve constant. In all actuated valves, the through-flow quantity thus remains dependent only upon the travel of the valve spool and not upon the load pressure of the consumers.

There are load-sensing control systems in which the pressure regulator connected upstream of the flow cross section of the respective valve and is acted upon in the closing direction by the pressure upstream of the flow

cross section and in the opening direction by the pressure downstream of the flow cross section and by a spring. The spring determines the value of the pressure difference over the flow cross section. In the case of an undersaturation, when the pressure medium (i.e., working fluid) quantity requested by the valve actuation is greater than the pressure medium quantity which can be maximally delivered by the pump, the pump Δp, and thus the pressure difference over the flow cross section of the valve by which specifically the hydraulic consumer with the highest load pressure is controlled, falls. The consumer moves more slowly. The other consumers continue to receive sufficient pressure medium. This leads to a potentially dangerous change in the motional path which is taken by the equipment of a work appliance and which results from the actuation of the various hydraulic consumers.

Also, there are load-sensing control systems in which the pressure regulator is connected downstream of the flow cross section of the respective valve and is acted upon in the closing direction by the highest load pressure of all simultaneously actuated hydraulic consumers and in the opening direction by the pressure downstream of the flow cross section. Here the pressure regulators throttle the volumetric flow respectively to such a degree that, downstream of all open flow cross sections, a pressure corresponding to the highest load pressure prevails. Downstream of all open flow cross sections, the same pressure therefore obtains. Upstream of the flow cross sections, pump pressure obtains which exceeds the highest load pressure by the pump Δp. In the case of an undersaturation, the pump pressure

diminishes. Although the pump pressure over the flow cross sections then diminishes, it continues to be the same for all flow cross sections. The result is that all pressure medium quantities flowing through the different flow cross sections diminish by the same factor and the distribution of the whole of the available pressure medium quantity does not change, i.e. is independent of the individual load pressures of the hydraulic consumers. From this derives the expression "load-independent flow distribution" (LIFD). The motional path of the equipment does not change, but the movement simply becomes slower. These systems can be quite expensive to implement.

This invention provides a cost-effective control device by which two hydraulic consumers of a work appliance perform movements which have a specific relationship to each other. The control device is constructed according to the principle of an LFID control system and the valves can be controlled in such a way that the ratio of the pressure medium quantities supplied to the two cylinders is kept at a constant value irrespective of the size of the control pressure supplied to the first valve. Moreover, the Applicants claimed control device ensures that the relationship between the movements of the two hydraulic consumers controlled by the two valves is maintained not only when the pump delivery is sufficient, but also in the event of an undersaturation.

In the control device described in Ishizaki et al. (corresponding to U.S. Patent No. 6,561,751), the pressure regulators 8 and 9 are arranged with respect to the flow cross sections of the valves 6 and 7 such that, if the discharge of the pump is insufficient, the quantity of pressure medium

flowing to the hydraulic consumer with the highest load pressure diminishes. If one of the consumers controlled by the two valves is the one with the highest load pressure, and the geometric relationship between the movements of the two consumers changes in unpredictable ways. This can lead to dangerous situations, in particular also owing to the fact that the operator of the appliance is all the while assuming and depending on the machine to execute the desired movements which, at this point, it would not. Likely, the operator would discover this divergence between what he thinks the machine will do and what it actually does only through the experience of witnessing the latter.

In contrast, the claimed control device of the invention provides enhanced reliability of operation, since the relative movement of those parts of the equipment of a work appliance which are moved by the two hydraulic consumers is maintained, even in the event of an undersaturation. (To further emphasize this aspect of the invention, the sole independent claim has been further amended to make this explicitly clearer.) As these claimed aspects of the invention are not taught in Ishizaki et al. or Emanie et al., the rejections should be withdrawn.

For at least the aforementioned reasons, the Applicant respectfully believes that the rejections are improper and should not be maintained. It is respectfully submitted that the application is in condition for examination and reconsideration and such action is respectfully requested.

FEES

This response is being filed with a petition for a one-month extension of time and the required fee via credit card authorization. No further fee is believed to be required. If, on the other hand, it is determined that any further fees are due or any overpayment has been made, the Assistant Commissioner is hereby authorized to debit or credit such sum to Deposit Account No. 02-2275.

Pursuant to 37 CFR 1.136(a)(3), please treat this and any concurrent or future reply in this application that requires a petition for an extension of time for its timely submission as incorporating a petition for extension of time for the appropriate length of time. The fee associated therewith is to be charged to the above-mentioned deposit account.

An early and favorable action on the merits is earnestly solicited.

Respectfully submitted,
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I hereby certify that this document is being electronically transmitted to the Commissioner for Patents via EFS-Web on September 12, 2008.

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BY: Carla Curado